

Claim

1. Device for therapeutic and cosmetological photoprocessing of biological tissue, comprising power supply 3 and source of electromagnetic radiation 34 contained in the body, said source made in the form of incandescent lamp 4, reflector 6 for concentrating said radiation 34 onto the biological tissue 17 to be processed, transparent dielectric 12 in the form of a waveguide connected to a cooling system and in contact with the biological tissue 17 to be processed, as well as a spectral filter, *characterized by* the fact that incandescent lamp 4 is connected to power supply 3 through modulator 30, which comprises resistometer 38 of the incandescent filament 37 of lamp 4 and power regulator, and the inner surface of reflector 6 consists of mirror surface 7 made with the additional function of returning radiation 34 reflected from the biological tissue being processed back to the biological tissue 17.

2. Device for therapeutic and cosmetological photoprocessing of biological tissue per claim 1, *characterized by* the fact that the spectral filter may be made in the form of absorbent filter 8.

3. Device for therapeutic and cosmetological photoprocessing of biological tissue per claim 1, *characterized by* the fact that the spectral filter may be made in the form of fluorescent converter 9.

4. Device for therapeutic and cosmetological photoprocessing of biological tissue per claim 1, *characterized by* the fact that the spectral filter may be made in the form of reflective coating 7 of reflector 6.

5. Device for therapeutic and cosmetological photoprocessing of biological tissue per claim 1, *characterized by* the fact that transparent dielectric 12 is located in metal mount 13, fixed inside body 1, to one side of which metal plate 16, connected to cooling system 33, is tightly joined in contact with biological tissue 17.

6. Device for therapeutic and cosmetological photoprocessing of biological tissue per claim 1, *characterized by* the fact that radiation-absorbent filter 8 is made in a form that together with the dielectric forms an optical wave guide with a sandwich structure consisting of fluorescent converter 9, coolant nonfreezing liquid 10, and optical thermal insulator 11.

7. Device for therapeutic and cosmetological photoprocessing of biological tissue per claim 1, *characterized by* the fact that the region of the inner surface of reflector 6 located above incandescent lamp 4 is shaped as a part of an ellipsoid or sphere with a center of curvature in the center of that facet 36 of the waveguide which is nearest to lamp 4, and the region of the in-

ner surface of reflector 6 located between incandescent lamp 4 and said facet is inclined to the latter at an obtuse angle.

8. Device for therapeutic and cosmetological photoprocessing of biological tissue per claim 7, *characterized by* the fact that the region of the inner surface of reflector 6 located between incandescent lamp 4 and the facet 36 of waveguide 8 closest to it consists of the lateral surface of a frustum of a cone or right tetrahedral pyramid whose minor base is said facet, and the dihedral angle between it and the lateral surface or facet is between 115° and 120°.

9. Device for therapeutic and cosmetological photoprocessing of biological tissue per claim 1, *characterized by* the fact that reflector 6 and transparent dielectric 12 are made of two halves with a common axis of rotation 39, incandescent lamp 4 is located on the inner side of one of the halves of reflector 6, and each of the halves of transparent dielectric 12 may be made with the function of spectral filter and mounted on the corresponding half of reflector 6 so as to permit placement of biological tissue 17 between the halves of dielectric 12 with the halves of reflector 6 in the closed position.

10. Device for therapeutic and cosmetological photoprocessing of biological tissue per claim 9, *characterized by* the fact that the inner surface of reflector 6 with its halves in the closed position constitutes an ellipsoid of revolution, the coil of incandescent filament 37 of lamp 4 is located at one of its foci 47 the axis of which lamp is oriented along the major axis 39 of the ellipsoid, the halves of transparent dielectric 12 are made in the form of sphere segments 44 with bases parallel to the major axis of the ellipsoid and to the axis of rotation of the halves of reflector 6, the sphere segments are mounted on the halves of the reflector so that their common center coincides with the second focus 43 of the ellipsoid and with the biological tissue 17 located between the sphere segments.

11. Device for therapeutic and cosmetological photoprocessing of biological tissue per claim 9, *characterized by* the fact that the inner surface of reflector 6 with its halves in the closed position constitutes the surface of an elliptical cylinder whose generatrix is parallel to the axis of rotation of the halves of reflector 6, the coil of incandescent filament 37 of lamp 4 is located at the level of one focus of the ellipse, the axis of which lamp is aligned parallel to the generatrix of the elliptical cylinder, and the halves of transparent dielectric 12 are made in the form of halves of cylinder 48 mounted on the halves of reflector 6 so that the axes of said cylinder coincide with the biological tissue 17 located between its halves and the orientation of the genera-

trix of cylinder 48 of dielectric 12 coincide[s] with the orientation of the axis of the coil of incandescent filament 37.

12. Device for therapeutic and cosmetological photoprocessing of biological tissue per claim 9, *characterized by* the fact that
5 the inner surface 7 of reflector 6 with its halves in the closed position constitutes the surface of an elliptical cylinder whose generatrix is parallel to the axis of rotation 39 of the halves of reflector 6, the coil of incandescent filament 37 of lamp 4 is located at the level of one focus 42 of the ellipse, the axis of which lamp is
10 aligned parallel to the generatrix of the cylinder, and the halves of transparent dielectric 12 are made in the form of right prisms 47 with irregular polygons in their bases, oriented with their lateral edges parallel to the axis of rotation 39 of reflector 6, and prisms 47 are mounted so that the focal axis 39 of the elliptical
15 cylinder coincides with the biological tissue 17 located between prisms 47.

13. Device for therapeutic and cosmetological photoprocessing of biological tissue per claim 4, *characterized by* the fact that
20 the reflective surface 7 of reflector 6 is made of material that selectively reflects radiation 34 with a wavelength between 600 and 2500 nm.

14. Device for therapeutic and cosmetological photoprocessing of biological tissue per claim 1, *characterized by* the fact that
25 the number of incandescent lamps 4 or the number of incandescent filaments 37 in one lamp 4 may be greater than one, and incandescent filaments 37 may be flat.

15. Device for therapeutic and cosmetological photoprocessing of biological tissue per claim 9, *characterized by* the fact that
30 coolant nonfreezing liquid 10 additionally possesses the qualities of absorbing radiation or re-emitting radiation in a different part of the spectrum and is placed in tube 22 connected to pressurizing pump 33.

16. Device for therapeutic and cosmetological photoprocessing of biological tissue per claim 1, *characterized by* the fact that
35 the space within reflector 6 is connected via an air line to air compressor 31.

17. Device for therapeutic and cosmetological photoprocessing of biological tissue per claim 1, *characterized by* the fact that
40 cooling system 33 of transparent dielectric 12 and the metal plate may contain Peltier elements 14.

18. Device for therapeutic and cosmetological photoprocessing of biological tissue per claim 3, *characterized by* the fact that
45 fluorescent converter 9 and optical thermal insulator 11 forming the sandwich structure are made of ruby or sapphire with titanium and optical glass, including quartz glass, respectively.

19. Device for therapeutic and cosmetological photoprocessing of biological tissue per claim 1, *characterized by* the fact that it is additionally fitted with a system for water or air cooling of the body.

5 20. Device for therapeutic and cosmetological photoprocessing of biological tissue per claim 3, *characterized by* the fact that the bulb of incandescent lamp 4 and/or tube 5 surrounding bulb 4 are additionally made with the function of fluorescent converter.

10 21. Device for therapeutic and cosmetological photoprocessing of biological tissue per claim 1, *characterized by* the fact that incandescent filament 37 of lamp 4 constitutes a flat emitter whose plane is parallel to the plane of the biological tissue to be processed, and the part of the inner surface of reflector 6 located above the lamp is at a distance no less than $1.2d$ from the waveguide facet 36 nearest to lamp 4, where d is the outer diameter of the lamp bulb.

22. Device for therapeutic and cosmetological photoprocessing of biological tissue per claim 1, *characterized by* the fact that the radiation-absorbing filter is made in the form of a sandwich structure with the function of waveguide for radiation from lamp 4 to biological tissue 17 and back and formed, in the direction perpendicular to the surface of the biological tissue, of a frustum of a tetrahedral pyramid 51 made of transparent material with an index of refraction no less than 1.76 whose major base faces lamp 4, water at a temperature of 1°C to 10°C , and a cubical transparent dielectric in contact with the biological tissue and formed, in a direction parallel to the surface of the biological tissue, of the same frustum of a tetrahedral pyramid 51, water at a temperature of 1°C to 10°C , and the inner surface 52 of the reflectively coated tip.

23. Device for therapeutic and cosmetological photoprocessing of biological tissue per claim 1, *characterized by* the fact that transparent dielectric 12 is located in a metal mount equipped with a cooling system employing liquid at a temperature of -1°C to -18°C .

24. Device for therapeutic and cosmetological photoprocessing of biological tissue per claim 1, *characterized by* the fact that it is additionally equipped with a feedback system whose circuit incorporates a patient pain threshold sensor, incandescent filament 27 of lamp 4, and power supply 29.

25. Device for therapeutic and cosmetological photoprocessing of biological tissue per claim 1, *characterized by* the fact that it is additionally equipped with a light interrupter controlled by the patient's pain threshold or by a pain sensor in the form of an

iris sensor or blood flow sensor.

26. Device for therapeutic and cosmetological photoprocessing of biological tissue per claim 1, *characterized by* the fact that power supply 29 is equipped with a battery.

5 27. Method of therapeutic or cosmetological photoprocessing of skin, in which skin 17 is precooled, and then, while cooling continues, irradiated with light 34 from incandescent lamp 4, *characterized by* the fact that, to accomplish photodestruction of hair bulb 35, irradiation is performed in two phases, the first of
10 which is intended to preheat dermis 17 to a temperature not exceeding the denaturing point and lasts 0.1-100 s in the 1100-2500 nm band with a peak in the 1300-1400 nm region and power density of 10-60 W/cm², and the second, which immediately follows the first, is intended to destroy hair bulb 35 and
15 lasts 0.05-10 s in the 600-1200 nm band with a peak in the 600-1000 nm region and a power density of 80-800 W/cm².

28. Method of therapeutic or cosmetological photoprocessing of skin, in which skin 17 is precooled, and then, while cooling continues, irradiated with light 34 from incandescent lamp 4, *characterized by* the fact that, to accomplish photodestruction of hair bulb 35, irradiation lasts 0.05-10 s in the 600-1200 nm band
20 with a peak in the 600-1000 nm region and a power density of 80-800 W/cm².

29. Method of therapeutic or cosmetological photoprocessing of skin, in which skin 17 is precooled, and then, while cooling continues, irradiated with light 34 from incandescent lamp 4, *characterized by* the fact that, in order to accomplish photocoagulation of blood vessels or veins, irradiation is performed in two phases, the first of which is intended to preheat dermis 17 to a
25 temperature not exceeding the denaturing point and lasts 0.1-100 s in the 500-2500 nm band with a peak in the 700-1500 nm region and power density of 1-50 W/cm², and the second, which immediately follows the first, is intended to coagulate the vessel or vein and lasts 0.05-1 s in the 400-1200 nm band with a peak
30 in the 500-1100 nm region and a power density of 10-500 W/cm².

30. Method of therapeutic or cosmetological photoprocessing of skin, in which skin 17 is precooled, and then, while cooling continues, irradiated with light 34 from incandescent lamp 4, *characterized by* the fact that, in order to selectively damage collagen in dermis 17 to stimulate its regeneration or in order to selectively damage subcutaneous fat, irradiation is performed
35 with light in the 600-2500 nm band with a duration of 0.1-1000 s and a power density of 0.1-500 W/cm².

45 31. Method of therapeutic or cosmetological photoprocessing

- 5 of skin, in which skin 17 is precooled, and then, while cooling continues, irradiated with light 34 from incandescent lamp 4, *characterized by* the fact that transparent dielectric 12 and metal plate 16 of the device per claim 5 are brought into thermal contact with skin 17, and then, simultaneously with irradiation or in the intervals between irradiations, the device is moved along the surface of skin 17 so that a new unirradiated area of skin 17 first contacts metal plate 16 and then transparent waveguide 12.

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